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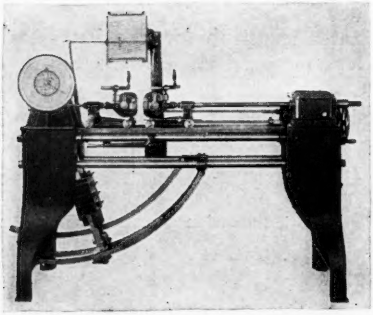

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STANDARD OF THE WORLD

Adjourned Eleventh Annual Meeting

New Arrangement with the Textile Foundation Approved

THE ADJOURNED ELEVENTH ANNUAL MEETING of the U. S. Institute for Textile Research, retrospect as its agenda may have seemed, was high-lighted by a matter of singular importance and concern, not only to the Institute's members and directors but to The Textile Foundation and all those associated with and interested in the textile and allied industries. What was to be the future of the Institute and what kind of reorganization would best serve to assure its permanency were the questions long under serious consideration. As stated in our preliminary announcement in the May issue of TEXTILE RESEARCH, a new and, we believe, highly satisfactory working arrangement now has been effected between The Textile Foundation and the U. S. Institute for Textile Research. Associates and friends will be gratified to know that the ten years' devotion of the Institute to the progress of the textile industry will not be lost and that when The Textile Foundation ceases to function, as it may a few years hence, the Institute will be there, strongly organized, to carry on where the Foundation leaves off.

The sessions were held at the Hotel Commodore, New York, N. Y., Friday, May 16, 1941. The program was as follows:

11:00 a.m.—Meeting of Board of Directors.
12:30 p.m.—Luncheon.
2:00 p.m.—Annual Meeting.

SPECIAL ANNOUNCEMENT

Change of Name

YOUR special attention is called to the vote of the members present to change the name of the Institute to

TEXTILE RESEARCH INSTITUTE

There are legal hindrances to this procedure and steps are now being taken to bring about the change. In the meanwhile, however, perhaps until the next annual meeting, we shall have to operate under the old name.

Change of Address

Under the new program the executive office of the Institute has been transferred from Boston to New York, and is now located at 10 East 40th Street. The headquarters office of The Textile Foundation, Room 225, Industrial Building, National Bureau of Standards, will serve as the Washington branch of the Institute, and vice versa.

New Members Elected

The following members were elected at the meeting of the Board of Directors: Contributing—Bigelow-Sanford Carpet Co., Inc.; Sidney Blumenthal & Co., Inc.; Merrimac Division, Monsanto Chemical Co.; North Star Woolen Mill Co. Annual—J. Robert Bonnar, General Dyestuff Corp.; Dr. H. O. Kauffman, Gaston County Dyeing Machine Co.; Bert H. White, Liberty Bank of Buffalo; Charles C. Fagan, C. H. Masland & Sons; James A. Jonas, Pellissier, Jonas & Rivet, Inc.; Alexander Leggin, Pittsburgh Plate Glass Co. Research Lab., Brush Division, Baltimore; John E. Hull, Victor Ring Traveler Co.; Dr. A. C. Walker, Bell Telephone Laboratories; S. Greenspan, Waumbec Mills; George Ohl, Woolrich Woolen Mills; Austin P. Dunn, Samson Cordage Works.

Minutes of the Annual Meeting

Pursuant to a call authorized by Dr. Louis A. Olney, Acting President, issued May 6, 1941, the adjourned annual meeting of the Institute was held at the Hotel Commodore, New York, N. Y., Friday, May 16, and was called to order by the Acting President at 1:30 p.m. After noting that a quorum was present in person or by proxy and after making a few preliminary remarks on why the meeting had been postponed, Dr. Olney declared the meeting ready for action on the following agenda:

1—Minutes of last meeting.
2—Report of Treasurer.
3—Report of Auditor.
4—Report of Secretary's Office.
5—Report of Research Council.
6—Action upon membership applications.
7—Report of the Special Committee which has been considering the future program of the Institute.
8—Action upon any resolutions which may be presented by this Special Committee.
9—Report of Budget Committee.
10—Report of Nominating Committee.
11—Election of New Directors and Officers.
12—New Business.

1. As the minutes of the last meeting (Nov. 14, 1940) had been published in the January, 1941, issue of *Textile Research*, they were accepted without reading and ordered filed.

2. The report of the Treasurer as of May 12, 1941, was reviewed, accepted and ordered filed.

3. The Auditor's letter certifying as to the accuracy of the books, bank records and approved vouchers of the Institute for the fiscal year which ended September 30, 1940, was as follows:

Report of Auditor

October 24, 1940

To the Board of Directors
United States Institute
for Textile Research, Inc.

Dear Sirs:

I have audited the cash book, bank records and approved vouchers of United States Institute for Textile Research, Inc., for the fiscal year ended September 30, 1940, and hereby certify to the accuracy of the same as shown by the following Exhibits.

Cash receipts, as charged, inclusive of the amounts transferred from *Permanent Fund*, $450.00, have been duly accounted for, and the cash payments substantiated by the cancelled paid cheques, bank charges and vouchers presented. I have reconciled the bank balance at the end of the year under review, with reservation for outstanding cheques.

The balance shown by Exhibit "B," Permanent Fund, has been verified by inspection of the pass-books, No. 51549 and No. 22606, pertaining to same.

Respectfully submitted,
(signed) ROBERT DYSART

4. The report of the Secretary's Office was read, accepted and ordered filed.

Annual Report of Research Council

The chairmen of the committees responsible for the administration of the several research projects of the Institute all reported to you at some length at the Research Conference in November, 1940, and their statements are reported in the January, 1941, issue of *Textile Research*. Therefore, this report can be brief.

Old Warp Sizing Research

The results of the old warp sizing research which was terminated over two years ago have been published in *Textile Research* as rapidly as possible. Six papers appeared in 1940, one has appeared in 1941, and the final paper of the series is scheduled in June.

New Warp Sizing Research

The new warp sizing research was started on October 1, 1940, after a delay of several months, during which efforts were being made to obtain a miniature slasher at a price within our budget. Failing in this, equipment was improvised and used in preliminary tests of a variety of starches and

gums. Much data have accumulated and a progress report covering this work should go to the subscribers soon. The report has been held up because of the illness of our research associate, Mr. Cobb. Difficulty has been experienced in obtaining yarns for larger scale experiments but these are now being spun. A loom has been equipped to take a series of narrow warps so that eleven different experimental yarns can be woven at one time. Mr. Carl R. Harris, Chairman of the Administration Committee for this project, feels that the project is on the verge of showing some real results.

Drying Research

Three years of work on this project were completed and the research associateship at the National Bureau of Standards was terminated on July 1. Three reports were published during 1940 and one is ready for publication. One, or possibly two papers may be forthcoming before closing this project.

Wool Processing Research

The proposed project on effects of processing on the wool fiber was the subject of extended discussion at the meeting in November, 1940. Solicitation of support for it following that meeting gave us fifteen favorable replies, but further efforts have been awaiting a decision as to the future of the Institute.

Economic Research

The study of textile inventory policies and statistical guides, in which our Committee on Economic Research is cooperating with the Industrial Research Department of the Wharton School, is nearing completion at the end of its second year. A full report from F. S. Blanchard, Chairman of our Economic Research Committee, follows. At the meeting Mr. Blanchard introduced Mr. Hiram Davies who spoke briefly of the work.

In conclusion it is noteworthy that the drying and warp sizing researches have been financed wholly by the industry and that the proposed wool processing research is expected to be. Additional funds are needed for the warp sizing study and the funds pledged for the wool work are far short of the estimated need. The financing of its projects is one of the serious problems of the Council.

Report of Committee on Economic Research

The results of the Textile Foundation study of inventory policies in the textile industries, which was originated and recommended to the Foundation by the U. S. Institute's Committee on Economic Research is in the process of being published. At the suggestion of the Committee, the results are being presented in a series of seven reports, the first of which was issued on April 28th, 1940, under the title, "What To Do About Denim Stocks." It was felt by the Committee that the study would receive more attention if issued as a series of reports over a period of time rather than as a single publication.

The complete series, in addition to the report already issued on the management of denim inventories, includes studies of inventory problems in

the manufacture of men's wear fabrics of wool, cotton fine goods, rayon dress goods, cotton print cloths, women's full-fashioned hosiery, and an over-all appraisal of inventory trends and policies in textile production and distribution during the 1930's. Copy for the wool and fine goods reports has been sent to the printer and their publication should occur toward the end of May. June publication is planned for the remaining reports in the series.

As members of the U. S. Institute for Textile Research will remember, this is the project on which our Committee have been concentrating their attention. Recently a meeting was held with representatives of the Wharton School, who are undertaking the report, and representatives of the Textile Foundation, to discuss the final presentation of this whole matter, which, as explained above, is now in process of publication.

Report of Special Committee on Future Program of the Institute

The members of the Special Committee who represented the Institute in the development of its future program were Dr. Robert E. Rose, Mr. F. S. Blanchard, Dr. Harold DeWitt Smith and Mr. Douglas G. Woolf. Dr. Rose was asked to present the report for the committee; and, as we believe you will obtain thereby a more comprehensive idea of the plan than from any summary we might write, we are quoting excerpts taken from the stenotypist's transcript of Dr. Rose's remarks:

> "You will remember that when the Institute was founded it was to do great things. It was to be armed with the armor of research and go forth and persuade all textile people that their whole industrial defense—not national defense—depended on research and that they were to foster research in every possible way. As a matter of fact, the Institute has done great things, but in general the behavior of its finances has reminded me of one of these little mechanical things that you put on an inclined plane. As soon as it is started it goes back to the bottom. Then you have to lift it up and it goes to the bottom again. Each year we have been wondering how we could get a further and more enthusiastic support because, after all, you can't do research without money. . . .
>
> "The members of the committee came to the conclusion that there was a possibility, and that the Institute in a sense had a duty to perform which it could perform better if a radical reorganization took place. They tied this in with a very keen understanding of what was going on in the matters of The Textile Foundation which has supported research both of a scientific nature and in economics, and also strived to improve, and has succeeded in improving, the teaching of subjects in textile schools. They felt that the Institute should begin just where the Foundation left off.
>
> "If it could be so arranged that the Foundation continued its work and the Institute carried the effect of that work out into the industry, aroused interest, was able in some way to obtain membership so that the men felt that they were working along with the efforts of the research group, a great deal might be done; in fact, as we looked

at it, the Foundation was in a sense bound to find some organization and to perpetuate the results of its work because . . . in a number of years, and not so very many, the effort paid for by the Foundation must cease. . . .

"It soon appeared to the group interested that there was one way in which this could be brought about. That was by tying the two organizations together and yet leaving each independent. That is quite an important point. There was to be no taking over of one by the other or anything of that sort. It seemed to all of us that that would be an ideal way of bringing the two organizations together. . . .

"On April 16th the suggestions were made to the Board of The Textile Foundation; and they didn't, of course, approve anything but merely said they would like Messrs. Hobbs, Cheney and Comer to meet with any of our representatives and discuss the detail of such an arrangement within a favorable light. In the meantime, we had a meeting and the group was converted to a sort of committee and authorized to go ahead and see what could be done.

"It has now reached this stage: Mr. Pickard is willing; the Foundation is willing; and it is for us who have been, as it were, working behind the scenes to come out into the open and ask you whether you also are willing to agree to the proposals." . . .

Proposals for Financing

"The proposals are in general these: The Textile Institute will have an office in New York, which will be in charge of Mr. Pickard as Secretary. That office also will be an office of The Textile Foundation in New York, and they will continue their office in Washington."

Under the new arrangement the United States Institute for Textile Research will be called upon the first year to provide approximately $4,000.00, which would include $3,000.00 for Mr. Pickard's salary. The balance of the required expenses would be taken care of by The Textile Foundation.

"How is this thing to grow? How is this new arrangement to function? We have felt that it is very difficult to reach the man holding the purse in the textile industry without persuading him, of course, that he is getting something for his money, and that ordinary papers published in an ordinary way have no such effect. On the other hand, the Foundation has found that sending out anybody who can speak as ably and as persuasively as Dr. Milton Harris, who will make a most excellent salesman, is a very excellent way of introducing the subject. The Foundation has expressed a willingness to see Dr. Harris employ rather more of his time than he has in the past . . . in forming a one-man expedition into the place where treasure is to be sought.

"The idea is that he should meet not alone with the technical man . . . but with the man who pays the technical man his salary and looks after the finances. We found that in general when the approach is made through the Bureau of Standards we can get at those men who are responsible for financial outlay, something which we have never done before. . . . There is no idea that we will get out and raise

$50,000.00 just like that. It has to be done by the growth of a good idea. As soon, of course, as the Institute ever does get to the happy stage where its income is sufficient, it can defray more of the expenses of the office. That in a general way is the outline of what was proposed and is proposed to you."

7. It was moved, seconded and unanimously voted: That the United States Institute for Textile Research, Inc., endorse the report in this rough form, and that they agree to the cooperation with The Textile Foundation which involves the election of Edward T. Pickard as Secretary of the Institute, and that this arrangement be made effective as of June 1, 1941.

Change of Name

Dr. Rose: "There is one point that comes up in connection with this, which you also might act on. . . . Don't you think that the U. S. Institute for Textile Research is rather handicapped in having such an awfully long name? It seems so to this committee, and we have suggested that we change the name, which isn't such an easy matter because we are an incorporated organization, to Textile Research Institute. . . . We feel that it would be a very distinct advantage. . . ."

8. It was moved, seconded and voted: That the special committee be empowered to take the necessary steps to change the name of the United States Institute for Textile Research to Textile Research Institute.

9. The Budget Committee made no formal report at this meeting. Dr. Rose, speaking for Dr. H. DeWitt Smith, Chairman, stated that Dr. Smith was looking into the possibilities of forming some sort of conclusion regarding the expenses that will be involved in this new plan but that he could not arrive at the estimated cost for running the Institute for the next year until some time in the future when more of the details have been worked out.

Report of Nominating Committee

On behalf of the Chairman, Mr. Earl Constantine, and the other members of the Nominating Committee, Mr. Ephraim Freedman presented the following report with the statement that it had been arrived at unanimously: (1) For a Director in the panel which expires in 1941: Dr. Harold DeWitt Smith of A. M. Tenney Associates to take the place of Mr. F. S. Blanchard, nominated as President of the Institute. (2) For eight Directors whose terms are to expire in November, 1943: John Bancroft, Jr., of Joseph Bancroft & Sons Co.; Fuller E. Callaway, Jr., of Callaway Mills; Earl Constantine, of the National Association of Hosiery Manufacturers; W. M. McLaurine, of the American Cotton Manufacturers Association; D. H. Powers, Röhm & Haas Company; Robert E. Rose, E. I. du Pont de Nemours & Company; Albert C. Walker, Bell Telephone Laboratories; Douglas G. Woolf, *Textile World*. (3) For officers for the Institute: President, F. S. Blanchard; Vice-President, Robert E. Rose; Vice-President, Fuller E. Callaway, Jr.; Treasurer, Harold DeWitt Smith; Secretary, Edward T. Pickard.

10. It was moved, seconded and voted: That the Secretary cast one ballot for the officers on the ticket as read, and she having done so, the Acting President declared the nominees elected.

11. It was moved, seconded and voted: That the directors of the panel were declared elected.

12. At the Directors' Meeting immediately following the Annual Meeting to which the membership was invited, it was moved, seconded and voted: That the officers nominated were declared elected.

13. It was moved, seconded and voted: That the personnel of the Executive Committee remain unchanged with the exception that Fuller E. Callaway, Jr., be placed on the Committee in lieu of Ernest N. Hood, and that the officers of the Institute shall be members of the Committee, *ex officio*.

14. As there was no new business, Dr. Olney turned the meeting over to Mr. Blanchard, the new President, who spoke of the very liberal attitude of the directors of The Textile Foundation from the very beginning and of their enthusiasm for the plan as expressed in their letters, a number of which he read to the meeting. After making a tribute to Mr. Pickard, the new Secretary, the President declared the meeting adjourned at 2:40 p.m.

Report of the Treasurer

May 12, 1941

General Funds

Receipts		*Expenses*	
Balance Oct. 1, 1940	$ 749.27	Salaries 2/3	$ 1,107.69
Contributing Memberships	2,350.00	Rent 2/3	160.00
Annual Memberships	1,560.00	Miscellaneous	481.02
Misc. income	28.50	Balance May 12, 1941	2,939.06
	$4,687.77		$4,687.77

Magazine

Advertising	$ 367.50	Salaries	$ 553.96
Textile Foundation	1,217.13	Rent 1/3	80.00
Subscribers, etc.	1,065.42	Printing magazine, reprints, etc.	1,907.73
		Miscellaneous	9.10
		Balance May 12, 1941	99.26
	$2,650.05		$2,650.05

Drying Research

Balance Oct. 1, 1940	$ 428.36	Balance May 12, 1941	$ 436.62
Insurance dividend	8.26		
	$ 436.62		$ 436.62

Wool Processing Research

Co-operators	$ 700.00	Misc. expenses	$ 7.65
		Balance May 12, 1941	692.35
	$ 700.00		$ 700.00

Warp Sizing Research

Balance Oct. 1, 1940	$3,392.11	Salaries	$ 478.83
		Expenses	729.09
		Stenographic Services	20.00
		Balance May 12, 1941	2,164.19
	$3,392.11		$3,392.11

SUMMARY

Balance May 12, 1941

General Funds	$2,939.06
Magazine	99.26
Drying Research	436.62
Warp Sizing Research	2,164.19
Wool Processing Research	692.35
	$6,331.48

Permanent Funds—Principal	$2,000.00
Interest available for use	$ 297.96

Continuous Filament Rayon Slashing:

Evaluation of Different Grades of Gelatins and Glues; Effect of Drying Warps to High Regains.

BY WILLIAM E. YELLAND *

A Research of U. S. Institute for Textile Research, Inc.

Summary

A series of continuous filament rayon warps, which had been sized with different grades of gelatins and glues, and some of which had been dried to high regains, all wove satisfactorily in the weave room. Comparisons were made among them using the criteria discussed in previous articles, namely, (1) the number of breaks due to balling-up in back of the reed and (2) the number of warp defects appearing in the greige goods.

It was then found that larger amounts of lower grade gelatin-glues were picked up by the warp and gave much better protection to the yarn than smaller amounts of high grade gelatin taken up by the warp from size baths of the same viscosity but of lower concentration. Moreover, the higher grade material showed a tendency to distribute itself less regularly on the yarn than the low grade material.

Warps dried to high regains, although not classed as soft warps by the slasher tender and weaver, showed a much higher number of breaks due to balling-up in back of the reed and a larger number of defects in the greige goods than the standard warps.

COMPARISON OF MEDIUM AND HIGH TEST GELATINS

Preparation of Warps

THE details of the preparation and slashing of these warps have been given in previous articles of this series. (See TEXTILE RESEARCH, X, No. 12, 526–529, Oct. 1940.) Each warp, 2400 yards long, contained 4296 ends of 150 denier 40 filament bright viscose. The warps were made on the silk system and slashed on a 7-can rayon system as described in preceding articles.

* Dr. Yelland was director at Massachusetts Institute of Technology of the filament viscose rayon phase of the warp sizing research from Jan. 1, 1936 to Sept. 30, 1938.

Materials

Two gelatins were available. The one normally used by the mill was of medium grade and had a gel strength of approximately 250 grams on the glue scale. In this article it is called "Standard." The second gelatin had a much higher gel strength, approximately 700 grams, on the same scale. It is called "High Test."

The softener was a typical mixture of sulfonated olive and cocoanut oils. It was used in the same concentration throughout the test. Table I gives a summary of the details of the slashing.

Table I

Number of Warps Sized	Gelatin Size Material	Size Concentration	Viscosity of Size Mix relative to Water at 140° F.	Average % Size on Yarn	Average Regain
6	Standard	3%	2.01	4.39%	10.3%
4	Standard	3%	2.01	4.19%	15.7%
4	High Test	1.8%	1.99	2.68%	10.1%

Two other mixes were made up using combinations of the High Test and Standard gelatins in an effort to obtain size baths having properties intermediate between those of the High Test mix and the Standard. However, only two warps were sized with each of these mixes and because of variations in the looms, the tests were not conclusive. The results are therefore not included herein.

In order to avoid variations in the results during weaving which might be due to differences in the individual looms, results should be taken from as many looms as possible. At least four looms are necessary to obtain results which are indicative.

Weaving

The warps as noted in the article referred to above, were woven at 160 picks per minute in cam looms in a three-leaf twill, construction 112 x 68. During weaving all the breaks were recorded and classified.

It was shown at that time that only the breaks due to balling-up in back of the reed could be attributed to size failure. Therefore, in order to compare the different size mixes and slashing conditions, the breaks due to balling-up and the warp defects in the greige goods were calculated for each 100 yards of fabric woven by each test loom. These were then averaged for each group of looms. The figures are given in Table II.

During the test period, 275 hours, the average production per loom for four looms in the group was 1068 yards. Thus each of the figures in the two right hand columns of Table II was based on slashing and weaving of 4000 to 6000 yards of rayon.

It will be seen from Table I that the High Test Gelatin, being used at lower concentration, deposited considerably less size—2.68%—on the yarn than the Standard Gelatin—4.39%—although the viscosity of the size bath was essentially the same in each case. This smaller amount of high

Table II

Size Material	Average % Size on Yarn	Steam Pressure in Dry Cans During Slashing	Average Regain of Warp After Slashing	Per 100 yards of fabric	
				Breaks Due to Balling-up	Warp Defects
Standard	4.39%	9.2 lbs.	10.3%	0.91	1.66
Standard	4.19%	5.9 lbs.	15.7%	1.89	2.39
High Test	2.68%	9.5 lbs.	10.1%	2.71	2.79

grade material did not protect the yarn as well as a larger amount of the standard material. This is shown in Table II by the fact that the breaks due to balling-up practically tripled in number, increasing from 0.91 to 2.71 per hundred yards, and the warp defects almost doubled in number, rising from 1.66 to 2.79 per hundred yards.

Thus the better grade of the material did not compensate for the smaller amount used on the yarn.

To use the High Test gelatin in the same concentration as the Standard would not be economical—because of the higher cost of the former—unless it resulted in a marked advantage in weave room efficiency or in finishing.

The next step in the test would therefore have been to determine the effect of slashing with the High Test gelatin at concentrations greater than that used in this experiment but still less than the concentration of the Standard. This would yield size mixes of higher viscosity. Consequently, more size would be deposited on the yarn, and better weaving efficiency would be achieved. The optimum condition would be reached when maximum weave room efficiency was attained without increasing the cost of the size material too much.

However, an observation was made which suggested a different procedure. Examination of a large number of cross-sections of the sized yarns showed that the distribution of the high grade material was less regular than that of the standard. The higher test material tended to collect more in aggregates between the filaments and had less tendency to form thin uniform films around the filaments and the yarn itself than did the medium grade material. This suggested that the use of lower grades of gelatins or glues would give a still more uniform size film which might protect the yarn better. Consequently pilot scale experiments were run for comparison of still lower grade materials against the standard or medium grade material.

COMPARISON OF MEDIUM GRADE GELATIN AGAINST LOWER GRADE GELATIN-GLUES

Materials

The materials used were a "gelatin" and a "gelatin-glue" obtained from one firm, and a "glue" obtained from a second firm. Their properties are given in Table III.

Two softeners were used representing different classes of softeners. These were sorbitol and a typical sulfonated vegetable oil. Sorbitol is a hexa-hydric alcohol, $CH_2OH—(CHOH)_4—CH_2OH$, possessing hygroscopic properties which are similar although not identical to those of glycerine, diethylene glycol, etc.

Sorbitol has the advantage over glycerine in that it picks up less moisture at high relative humidities and retains more moisture at low relative humities than does glycerine. It is thus a more stable humectant.

The sulfonated vegetable oil was the same mixture of sulfonated olive and cocoanut oils which had been used in the experiments with the High Test Gelatin. It contained approximately 12% water, and no unsaponifiable oils. It may be taken as a typical representative of the oil softeners.

Table III

Properties of Materials Used

Sample	*A*	*B*	*C*
Designation	"Glue"	"Gelatin"	"Gelatin-Glue"
Source	Hide Stock (Calf)	Ossein Stock	Hide Stock
Moisture	11.4%	13.1%	11.6%
Ash	3.0%	2.1%	2.9%
Gel Strength	185 grams	315 grams	315 grams
Viscosity	71 mlp	105 mlp	110 mlp
pH	6.1	5.8	6.6
Price (in barrel lots)	17¢ per lb.	28¢ per lb.	18¢ per lb.

Size Preparation

The gelatin or glue was soaked for half an hour in about 5 gallons of water. It was then heated slowly to 160° F. with constant stirring. When the size had all dissolved—this took about one to two minutes—the softener was added and enough water added to make 15 gallons. The size formulae are given in Table IV.

Slashing

The rayon used was 150 denier 40 filament bright viscose. A warp of 4296 ends, 512 yards in length was made with leases inserted every 128 yards. This was equivalent to four 128-yard warps wound consecutively on one warper beam. This was placed in back of the slasher and sized according to the usual procedure given in detail in earlier articles. The size mix was changed at the leases. Size temperature was kept at 140° F. during all slashing experiments.

During slashing of No. 127, nine ends were accidentally cut by the press roll at the front of the machine. This showed up later during the weaving and caused a portion of this warp to be classed as "Seconds."

Table IV

Composition of 15 Gallon Size Mixes

Number	Size	Weight	Concentration	Softener	Weight	Concentration
125	C	4.1 lb.	3.28%	Sorbitol	1 lb.	0.8%
126	B	4.1 lb.	3.28%	Sorbitol	1 lb.	0.8%
127	A*	5.2 lb.	4.16%	Sulfonated Oil	1 lb.	0.8%
128	C	4.1 lb.	3.28%	Sulfonated Oil	1 lb.	0.8%

* It will be noted that A is used in slightly higher concentration than B and C. This is to produce size mixes of as nearly the same viscosity as possible.

Weaving

The warps were woven consecutively in a cam loom operating at 160 picks a minute. The fabric was a three-leaf twill of 112 × 68 construction.

While the warps were not long enough to determine accurately the relative number of breaks due to balling-up in back of the reed, and the defects in warp and filling, or to secure representative cloth room gradings of the fabric produced, it was noted that they wove well and gave no difficulty in the loom. Inspection of the greige goods showed that all fabric produced was first grade with the exception of Warp 127 (Size A) which was damaged during slashing. There was no difference detected in these warps due to the difference in softeners.

Finishing

One criticism of low grade gelatins and glues has been that they are apt to leave the goods discolored or stained. This, of course, would be highly undesirable in the lighter shades. The test warps were therefore finished white in order to see if the size had any tendency to leave discolorations in the warp.

The finisher reported that no difficulty was experienced in removing the size and the finished goods were satisfactory. This might not necessarily be true of all gelatin-glues and glues. The source and the treatment of the gelatin-glue stock will determine in each case whether or not the size contains materials which will stain the yarn permanently. So it would be wise in using such glues for the millman to determine beforehand on small yarn samples whether or not the size contains materials which might injure the yarn.

USE OF GLUES AND GELATIN-GLUES AS FILAMENT RAYON SIZES

It was not possible, owing to the termination of the Warp Sizing Project, to extend the experiments to still lower grade materials and to determine how far down in the glue scale one can go for satisfactory filament rayon sizes. The indications are, however, that a high bloom strength or gel strength is not necessary for a filament rayon size. The high grade material suffers two disadvantages, namely, higher cost and less regular distribution on the yarn. The above experiments show that smaller amounts

of high grade material do not protect the yarn as well as larger amounts of medium or low grade materials.

Unless there arise difficulties which are at present unforeseen it would appear that the trend in sizing will be toward gelatin-glues of lower gel strength and bloom rather than toward those of higher gel strength and bloom.

EFFECT OF INSUFFICIENT DRYING ON WEAVING

It is well known what happens when a warp leaves the slasher in such a condition that the yarn feels damp to the touch. In order to prevent this, the slasher tender usually dries the warp until it feels satisfactory to him with the result that the warp leaves the slasher with a very low regain. In the weave room the yarn picks up moisture until a regain of 13 to 14% is reached, depending on the weave room humidity. This process is wasteful as it requires unnecessarily high steam pressures during slashing and may damage the yarn or insolubilize the size. But it is difficult to do otherwise with manual control. However, with the proper instrument controls it is possible to bring warps off the slasher with almost any desired regain.

In this experiment the attempt was made to bring the warps off the slasher at regains of 13 to 14% so they would not need to pick up more moisture in the weave room. Actually regains slightly higher than this were reached owing to an error in the calibration of the chart on the instrument and the warps left the slasher with regains between 15 and 16%. The instrument used has been described in an earlier article (TEXTILE RESEARCH, Vol. X, pages 526–530, Oct. 1940).

These warps so dried felt satisfactory to the slasher tender. In the weave room they were not appreciably different from the rest of the warps that is, they were not classed as "soft" warps. It was not until the actual records of the breaks due to balling-up and the warp defects were examined that the warps were found to be much less satisfactory than the warps dried to regains of approximately 10%.

Examination of the results in Table II showed that in the warps dried to a regain of 15.7% the number of breaks due to balling-up in back of the reed increased from 0.91 to 1.89 per hundred yards, that is, an increase of 100%. The warp defects detected in the cloth room rose from 1.66 to 2.39 per hundred yards, an increase of 44%. Over a longer period of time the breaks due to balling-up would begin to show up as a decrease in the weave room efficiency figures.

This indicated that it was not enough merely to dry the warp to the point where it felt dry to the slasher tender and the danger of mildew was avoided. The warp must be dried to such an extent that the size film was made tough enough to resist the loom abrasion. While it was not possible to set up a definite standard, as the weave room conditions differed from mill to mill, it was found that 10% regain left in the warp appeared to be satisfactory for the gelatins and the fabric constructions used in these experiments. For a warp of 4296 ends of 150 denier 40 filament bright viscose, slashed at a speed of 40 yards a minute, using a blanketed squeeze roll and applying approximately 4% size, a steam pressure of about 9 pounds on six of the seven dry cans was sufficient to dry the yarn to the desired regain of 10%.

Higher regains result in more balling-up in the loom and cause more warp defects. Lower regains are not economical as they require higher steam pressures and may result in damage to the yarn or in insolubility of the size.

The results of these experiments also showed clearly the need for the use of instrument control in place of manual control in modern rayon slashing. The yarn which was dried to high regain was considered satisfactory by the slasher tender although it had a much higher moisture content than usual. In general, however, the slasher tender, in order to avoid "soft" warps, overdries the yarn very much to the subsequent detriment of the fabric.

Since this work was completed adequate moisture control instruments have been developed and are now available on the market. With intelligent use of such control instruments, the drying of rayon warps can be standardized in a mill and the variations due to the personal element largely eliminated. This would avoid on one hand damage to the yarn and size insolubility arising from overdrying, and, on the other hand, the danger of soft warps, balling-up in back of the reed in the loom due to excessively high regains, and the possibility of mildew. The elimination of these alternate evils would result in much greater uniformity in the sized warps and lead in general to better weave room efficiency and a higher percentage of firsts in the cloth room. Such instruments warrant the careful consideration of the modern millman.

Cross Sectioning of Textile Materials by Hand Without Microtome or Other Special Equipment*

BY H. N. LEE† and E. R. SCHWARZ‡, F.T.I.

Abstract

The cutting of thin cross sections of textiles with microtomes of various designs is well established and has been thoroughly described in publications. Except for the cork method no description appears to be published for preparing very thin sections without the use of some kind of microtome. With the cork method it is not easy to cut sections sufficiently thin for best microscopical examinations. In the following, methods are described which can be used for cutting very thin sections, as thin as can be made with a microtome. These methods can be used with a microtome but entirely satisfactory sections for most purposes can be prepared with no special equipment of any kind.

Fundamentally these methods consist of impregnating a tuft or bundle of fibers or fabric with a material of such stiffness and tenacity that the fibers will be held in position during the cutting operation. Procedures are given in the following which have been satisfactorily employed.

General Method

Except for the impregnating material all methods are fundamentally the same. This is given in detail using isobutyl methacrylate for embedding.

1. Select a bundle of fibers (or yarns or fabric) so that the resulting strand will be roughly ⅛ inch in diameter and up to 3 inches long.
2. Draw the fibrous material out so that fibers will lie as nearly parallel as possible.
3. (May be omitted for quickest results.) Dip in water; draw bundle through fingers to compress fibers together; hang up to dry. It is often desirable to clip a clothespin or some other weight during drying to keep fibers more nearly parallel.
4. When dry "tack" ends of bundles together with thin, quick drying collodion. Allow collodion to dry and cut ends smooth.

* Research carried out in part for the International Silk Guild, Inc., and published with their permission.
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5. Dip the strand into the impregnating solution, for example,

3 parts by volume isobutyl methacrylate
2 parts by volume xylol.

Allow strand to remain in solution until completely penetrated. For loose strands this penetration is almost instantaneous. For denser strands, yarns, and the like, up to thirty minutes may be necessary. (Note: Solution should be as thick as possible permitting bundle to be introduced slowly without buckling.)

6. Hang up, permitting surplus solution to drain off.
7. Hang up to dry.

a. In room at ordinary temperature.
b. At higher temperature.

Depending on drying condition sections may be cut in 1 hour or longer. If high temperatures are used in drying there is distinct tendency for bubbles to form. For many purposes these cause no trouble.

8. When strand is sufficiently dry throughout, simply trim one end (the end hanging lowest is usually softer than the higher end) and cut sections by hand with a razor blade or any other very sharp edge. While it is not easy to cut sections of *uniform* thinness, with care at least part of the cut will be not over 10 microns in thickness.

9. Many other solvents than xylol may be used. For example, benzol which gives more rapid drying, dioxane which gives somewhat slower drying, etc. With most rapid drying the material may be cut sooner but, in extreme cases, bubbles may be troublesome.

10. Natural vegetable and animal fibers, artificial and synthetic fibers have been satisfactorily prepared using this procedure.

Other Impregnating Materials

Other syntheetic resins have been tried, some of which have given satisfactory sections. Some lack tenacity and others become too brittle before they are dry enough to cut.

Materials which have previously been used, especially in preparation of textiles for microtome cutting may also be used.

Gum Arabic

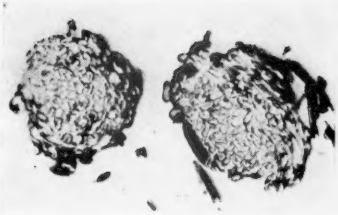
Formula: 100 g. gum arabic (pulverized)
90 cc. water, distilled
24 cc. glycerine, pure
10 cc. ethyl alcohol
1 g. salicylic acid (preservative)

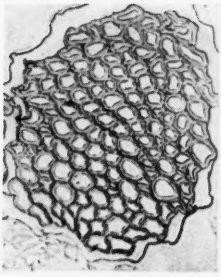
Stir thoroughly, allow to stand, skim off froth.

Prepare samples as described under methacrylate embedding. Soak in gum arabic solution for 2 hours. Drain off excess. Air dry or dry 2 hours at 50° C.

After drying, the embedded material *must be* conditioned for several hours in a relative humidity of 58 to 69 per cent. If too dry the gum arabic is too hard and brittle, if too moist it is too soft to cut.

1 2





3 4 5

1. Tsatlee silk in the gum. Embedded in 3440 beckamine.
2. Cotton yarn sized with starch. Embedded in isobutyl methacrylate.
3. Japanese silk in the gum. Embedded in gum arabic.
4. Manila. Embedded in collodion.
5. Courtral flax. Embedded in isobutyl methacrylate.

After embedding, each of these was cut by hand, using ordinary safety razor blade.

After conditioning the embedded sample may be dipped into paraffin to keep it in proper condition.

Sections cut best in a room with relative humidity about 60 per cent.

Plasticized Collodion

Formula: 23.0% dehydrated nitrocellulose,* 5–7 seconds cotton

20.0% No. 1 castor oil
0.8% White Rose mineral oil †
24.5% ethyl acetate 90%
9.0% toluol
18.2% naphtha, low flash
4.5% butyl acetate

To mix: Wet the nitrocellulose with toluol and naphtha, add ethyl acetate and butyl acetate. Stir until dissolved. Add castor oil and mineral oil *in small quantities* at a time, stirring until smooth. (The mineral oil is used to prevent blushing.)

Use of Plasticizers

With collodion a plasticizer is apparently absolutely necessary; with all synthetic resins tried it is desirable if impregnated bundles are to be kept more than a limited time. The resins alone tend to harden and become too brittle after some hours although some may be cut for several days. The length of time before they become too brittle varies with the drying conditions as well as the solvent, resin, etc. Plasticized impregnated material has kept in proper condition for months. With synthetic resins we have used M–17 (about 5%). Doubtless other plasticizers would be equally satisfactory. With collodion castor oil seems to be a satisfactory plasticizer. The formula given for collodion has been very satisfactory. It requires 6 hours or longer for drying but the embedded material can be kept apparently indefinitely.

Cutting Sections

Anyone with keen vision can cut and mount sections with the naked eye. Those with less keen vision will find the use of binocular loupes very helpful. When gum arabic is used the embedded strands must be cut, and are best kept, in air of relative humidity 55 to 60%. Fibers impregnated with synthetic resins or collodion handle better if they are seasoned and cut in an atmosphere of high relative humidity.

Mounting

Sections cut in apparently any impregnating material may be mounted in mineral oils (like Nujol) in which case the embedding material is not dissolved.

Sections cut in collodion can be mounted in most media used in making slides without dissolving the embedding material.

* As purchased. Is wet with 30% alcohol.
† Russian oil, nujol or other similar mineral oil may be used.

If it is desired to remove the embedding material suitable solvents can be used. With considerable care many sections can be handled when the embedding material is dissolved. Some of the sections may tip over on their sides. This is sometimes desirable. In some cases the use of fixative (egg albumin) is desirable or necessary.

Fibers may be handled in original condition, treated or stained with equally satisfactory results.

In our experience synthetic and animal fibers can be cut in any of the impregnating materials. Cellulose and especially lignified fibers are more satisfactorily handled in collodion than in synthetic resin and in gum arabic than in collodion.

Use of Microtomes

For thinnest sections of *uniform* thickness it is desirable to use a microtome. The Schwarz and similar types can be satisfactorily employed. Simply trim the impregnated bundle so that it fits the opening in the microtome. Cut without using any added collodion or other material.

The impregnated bundle may be re-embedded in paraffin and cut with rotary or sledge type microtomes.

Advantages

The chief advantages of the methods described are the necessity for no special equipment, simplicity and ease of operation (after little practice) and, in some cases, speed. In comparison with the quicker microtome methods the fibers are not crowded closely together and their outlines can be clearly studied.

Summary

1. Methods are described for cutting thin cross sections without the use of microtomes or other special equipment.

2. Materials are simply impregnated in synthetic resins, collodion or other materials which give necessary tenacity, stiffness and softness.

3. Sections may be cut directly by hand with ordinary razor blades.

4. All types of textile fibers and yarns can be handled, as well as some other material.

Abstracts

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Address, Secretary's Office: 65 Franklin St., Boston, Mass.

I. Fibers (Synthetic and Natural) and Fiber Analysis

Natural and Artifical Fibers and Dyes: Structure. R. Haller. *J. Soc. Dyers Col.*, 1940, V. 56, P. 425–432; abs. in *J. T. I.*, Dec. 1940, V. 31, P. A674.

Under the title "Textilosophy" the author discusses the origin and structure of fibers and dyes and man's attempts to manufacture them. He dismisses the teleological argument that cotton serves to disperse the seed in the wind. The lamellate structure of cotton is shown in a photomicrograph of a fiber swollen by cupri-ethylenediamine and it is argued that man has so far failed to reproduce such a structure in rayon. The striving for national self-sufficiency in fibers is condemned and Lanital is dismissed as a failure. (C)

The Physical and Mechanical Properties of Coconut Yarn. A. C. van Vreeswijk. *Mell. Textilber.*, V. 20, P. 483–7 (1939); abs. in *C. A.*, 1940, V. 34, Col. 8289.

Tests show that fiber fineness and strength of fiber and yarn varied irregularly over a wide range of com. grading which appears to be based on color differences. An unsuccessful attempt was made to develop a method for detg. the color of a fiber sample by measuring the depth of color of a soln. obtained by boiling the sample in caustic soln. Various retting processes in use for obtaining fibers from coconuts are described. (C)

II. Yarns and Fabrics

The Manufacture and Uses of "Fiberglas." Games Slayter. *Rayon Text. Mo.*, March 1941, V. 22, P. 74–5. (C)

Natural Protein-Base Spun Fibers. F. C. Atwood. *Am. Dye. Rptr.*, March 17, 1941, V. 30, No. 6, P. 138–140, 162. (C)

Notes on Carbonizing. G. Furlonger. *Text. Mfr.*, March 1941, V. 67, P. 110, 113.

Some points of recent change in outlook on the subject of carbonizing wool fabrics, including mixtures containing acetate fibers. (C)

Olive Oil Alternatives: Application. W. Garner. *Text. Mfr.*, 1940, V. 66, P. 453; abs. in *J. T. I.*, Feb. 1941, V. 32, P. A60.

The war has encouraged the use of oils other than olive for wool combing and spinning and at present combers have the permission of the Wool Control to use four of the oils which obtained satisfactory "Special Reports" from the Wool Industries Research Assoc. about four years ago. These are Nilox, Ester oil, Nilox Arachis oil, Topsol, and Perfecta, and the first two at least were in bulk use by combers and spinners in 1936. The "Special Reports" described extensive tests, carried out mainly on a large scale under bulk conditions, of the performance of the oils in the production of tops, in spinning, and in scouring and dyeing after storage. The W. I. R. A. has since issued the "Class A Specification" which sets out a number of laboratory tests that can be done in three or four days, and give some indication of the suitability of an oil for use in combing. It is pointed out, however, that laboratory tests cannot confidently predict what will happen to an oil when used in bulk and when oiled goods are stored for long periods. Practically all of the proprietary oils complying with this specification consist merely of raw or edible arachis oil with some kind of anti-oxidant. Recent articles in the trade press, some of which are quoted, express concern over the possible troubles that may arise through the use of such oils. The Combing Oil Assoc. formed at the request of the Wool Control now produces a "pool oil," known as "Control Combing Oil," to a formula supplied by W. I. R. A. This will always pass the Emergency Class A Specification, though its composition may possibly vary. (C)

Permanent Starch Finishes: Production. *Text. Weekly*, 1941, V. 27, P. 127, 129; abs. in *J. T. I.*, March 1941, V. 32, P. A110.

The ordinary types of finishes produced by treatment of textile materials with starch are not permanent since the starch is removed on washing. More permanent finishes are obtained if a synthetic resin is used to bind the starch in its insoluble form to the textile material. The starch in an unmodified condition is thoroughly mixed with a synthetic resin in its intermediate stage of formation and applied in colloidal solution to textile materials which are then dried and heated sufficiently to change the resin to its fully formed insoluble state. Water-resistant finishes may also be produced by the use of products obtained by treating starch with formaldehyde. An adhesive which may be used in the production of

laminated materials is obtained by first gelatinizing moist starch by passing it between heated metal rollers, then dehydrating at 135° C. in a current of hot dry air, and mixing with its own weight of 40% formaldehyde and 1/10 of its own weight of 1.8% hydrochloric acid. After application of this adhesive the materials are heated to about 120° C. (C)

Porous Stiffened Cotton Fabrics: Production. *Text. Mercury*, 1941, V. 104, P. 82; abs. in *J. T. I.*, March 1941, V. 32, P. A110.

In the production of stiffened fabrics by the application of thermoplastic materials such as cellulose acetate, resins and similar polymerized products, two methods have been devised for producing laminated fabrics which are permeable to air. One of these depends on suitable spacing of the thermoplastic substance in the layers of fabric before bonding. This can readily be accomplished when the thermoplastic substance is in the form of yarn which can be distributed in the fabric according to any desired pattern. In the other method, the bonding is effected under conditions such that the direction of flow and penetration by the softened thermoplastic substance is guided along spaced channels instead of being all over. For example, an assembly of two cotton fabrics having between them a fabric made of cotton yarns having cellulose acetate thread helically wrapped round them which has been impregnated with a swelling agent for the cellulose acetate, is placed on a cotton fabric which has been thoroughly wetted and mangled. Heat and pressure are applied to the top fabric and water vapor is thus caused to stream upwards from the wet cotton fabric. The lower cotton fabric of the assembly becomes united to the inner fabric with just enough adhesion to make a bond reasonably permanent in wear and the upper cotton fabric becomes firmly united to the inner fabric. At the same time the softening action of the organic products is so dissipated that the inner fabric does not become a non-permeable solid texture, but retains a large proportion of its structure and porosity. In this way a porous, durable three-layer fabric is obtained which is stiff without being board-like. Unique opportunities of spacing out the thermoplastic substance in the inner bonding fabric are offered by the use of lace and bobbin net materials. (C)

Processing Mixed Fiber Hosiery. L. J. Sheps. *Canadian Text J.*, March 14, 1941, V. 58, No. 6, P. 38, 40–2.

Data on methods of scouring, dyeing and finishing silk-Bemberg and silk-viscose hosiery manufactured with variable amounts of cotton. (C)

Rayon Combination Yarn Defects and How to Prevent Them. C. W. Bendigo. *Rayon Text. Mo.*, April 1941, V. 22, P. 61–2. (C)

Spinning and Twisting of Flax, Hemp and Jute. S. A. G. Caldwell. *Text. Mfr.*, March 1941, V. 67, P. 97.

Recent developments in the parts of the spinning mechanism. (C)

Treatment of Fibers. XI. Dispersion and Association. *Text. Mfr.*, March 1941, V. 67, P. 105–6, 113.

Types of groups constituting particles and their behavior in association and dispersion. (C)

III. Chemical and Other Processing (Not Otherwise Classified)

Automatic Control of Acid or Alkaline Baths. Somerset R. Waters. *Rayon Text. Mo.*, Sept. 1940, V. 21, P. 66–7. (C)

Carbonization of Silk Wastes. N. G. Rusakov and E. I. Petrov. *Shelk*, V. 8, No. 6, P. 26–9 (1938); *Chem. Zentr.*, 1939, I, P. 851; abs in *C. A.*, 1940, V. 34, Col. 6819.

Expts. on the carbonization of silk wastes (to remove impurities of vegetable origin) by the dry process by use of HCl gas at elevated temps. are described. The results showed that such a process can be used, although in order to preserve the strength of the fibers the period of preliminary drying must not be long and the amt. of HCl must not exceed 6% of the wt. of the fiber to be carbonized. (C)

Chemistry of Silk and Silk Processing: Recent Developments in the. Walter M. Scott. *Am. Dye. Rptr.*, 1940, V. 29, No. 21, P. 534–538, 565.

This article is the seventh in a series of reviews which have appeared in this journal under the same title. These reviews summarize the progress which has been made in the fundamental chemistry of the silk fiber and in the chemical processes which play a part in the transformation of the raw silk into the finished product. The previous articles have covered the developments prior to September, 1939. The present review brings the story up to October, 1940. For purposes of clarity, the subject is divided into four chapters as follows: 1. The Chemistry of Silk; 2. The Preparation of Silk; 3. The Dyeing and Finishing of Silk; 4. The Processing of Silk Hosiery. (C)

Chitin Xanthate and Regenerated Chitin. C. J. B. Thor and W. F. Henderson. *Am. Dye. Rptr.*, 1940, V. 29, No. 20, P. 489–491.

A method of preparing chitin xanthate is described, also the properties of a chitin xanthate dispersion, as well as the properties of chitin regenerated from such a dispersion. (C)

The Color of Pigment Mixtures. D. R. Duncan. *Proc. Phys. Soc.*, May 1, 1940, V. 52, P. 390–401; abs. in *Eastman Kodak Abs. Bull.*, September 1940, P. 495.

It is shown that the colors produced by mixing pigments in any given medium may be deduced from formulas involving two constants for each pigment. These constants, which vary with the wave length of the incident light, measure the absorbing power of the pigment for light and its scattering power, respectively. Relative values of these constants for a series of pigments may be deduced from their reflectivities at different wave lengths and reflectivities of one mixture of each pigment with one standard pigment. The relative values so obtained enable the reflection curves, and hence, if desired, the colors, of any mixture of two or more of the pigments investigated to be predicted correctly. (S)

DEVELOPMENTS IN ORGANIC NON-CELLULOSIC FIBROUS MATERIALS. Edward C. Worden, 2nd. *Rayon Text. Mo.*, 1940, Sept., V. 21, P. 59–60; Oct., V. 21, P. 39–41; Nov., V. 21, P. 40–2; Dec., V. 21, P. 37–9; 1941, Jan., V. 22, P. 53–4; Feb., V. 22, P. 49–50; Mar., V. 22, P. 61–3; Apr., V. 22, P. 55–7. (C)

THE DYEING OF CASEIN FIBERS. D. Ts. Kanter. *Legkaya Prom.*, V. 16, No. 11, P. 118–23 (1937); *Chem. Zentr.*, 1939, I, Col. 4683; cf. *C. A.*, V. 32, Col. 7270; abs. in *C. A.*, 1940, V. 34, Col. 7610.

Since they dye only by boiling, black and blue acid and chrome dyes cannot be used for casein fibers in the form of casein staple fiber, Italian lanital or casein fabrics contg. 50% wool because of the hydrolysis of such materials at 100°. Casein fibers can be dyed with acid blue and black dyes only by the introduction of protective colloids (sulfite waste liquor from cellulose) or by increasing the temp. resistance of the casein fibers. Satisfactory results were obtained in the dyeing of casein fabrics contg. 50% wool with Neolan dyes, such as Neolan Olive, Red, Orange and Rigan Blue 2R, the last of which dyes dark violet. E.g., with the olive-colored Neolan dye (a deriv. of diazopicramic acid coupled with acetyl-*p*-aminophenol) 3 different color tones could be obtained on casein fabrics contg. 50% wool, depending on such conditions of dyeing as the compn. of the dye soln., the temp. and duration of dyeing. The 3 color tones were light khaki with a yellow cast, a gray tone with a blue cast and khaki. The colors obtained by dyeing casein fabrics with Neolan Olive were tested to det. their fastness to light, to soap and to ironing and were found to be satisfactory. The fabrics showed no tendency to become rough as a result of the dyeing process. It is also possible to use ice colors for the dyeing of casein staple fiber. Of the substantive dyes, Pure Sky Blue FF, Anil Scarlet 4 BS and others gave good results when used for dyeing casein fiber at 50–60°. (C)

DYEING KHAKI ON LOOSE WOOL. "Concord." *Text. Mercury*, 1940, V. 103, P. 206–207; abs. in *J. T. I.*, Nov. 1940, V. 31, P. A612.

The advantages are stated of the pre-chrome process for dyeing long, locky wools which are difficult to dye level by the metachrome and afterchrome processes. If a ruddy tone, due to the presence of spent lime, develops in dyeing khaki on limed wool by the metachrome and afterchrome processes, it can be rectified by adding either more sulphate of ammonia or a little dilute sulphuric acid; if these methods fail it may be necessary to reduce the ruddiness by means of an acid green or bluish-green salting dyestuff. (C)

DYEING MILITARY FABRICS. John T. Gibbons. *Text. Wld.*, Nov. 1940, V. 90, P. 77.

Discusses the use of sulphur and mineral colors to produce olive-drab and khaki shades. (C)

THE DYEING OF NYLON FIBERS WITH ACID COLORS. P. H. Stott. *Am. Dye. Rptr.*, 1940, V. 30, No. 24, P. P646–P650. (C)

IMPROVED ELECTROLYTIC MORDANTING OF RAYON FABRICS. C. C. Downie. *Silk & Rayon*, August 1940, V. 14, P. 538. (C)

IV. Research Methods and Apparatus

Abrasion Tester. P. Larose. *Canadian J. Rsch.*, 1940, V. 18A, P. 161–4; abs. in *J. T. I.*, Jan. 1941, V. 32, P. A19.

A machine for testing the resistance of textile materials to abrasion is described in which the abrading surface is continually and automatically renewed. The fabric is rubbed back and forth over a cylinder covered with the abrading material. By means of a system of gears, the cylinder is rotated slowly and a second cylinder in contact with the first feeds the abrading material, which is in the form of a long tape, at the same speed. A revolution counter registers the number of strokes and an automatic stop shuts off the motor when the sample is completely worn out. A photograph and diagrams of the apparatus are given. (C)

Colorimetric Determination of Sodium Hydrosulphite and a Method of Determining the Hydrosulphite Content of Indigo Vats. J. Lotichius. *J. Soc. Dyers Col.*, Oct. 1940, V. 56, P. 434. (C)

A Colorimetric Method of Determining Indigo. J. Lotichius. *J. Soc. Dyers Col.*, Oct. 1940, V. 56, P. 433.

In a previous communication the present author described a colorimetric method of determining the indigo content of indigo vats. This method is based on the property of indigo of appearing in the form of a blue sol when sodium protoalbinate is added to an alkaline solution of leuco-indigo and the latter oxidized. This sol, which is extremely stable, was compared colorimetrically with a standard solution. The most satisfactory solution for this comparison proved to be a solution of Sirius Blue B and Sirius Green 2 B, made up according to specified conditions. In conclusion, the present author stated that the method cannot be applied as it stands for determining indigo itself, because losses are liable to occur during reduction of the latter. The conditions are now described under which this reduction proceeds quantitatively. If these conditions, which have been found to be quite normal ones, are adhered to, it is also quite easy to determine indigo itself colorimetrically. (C)

Comparison of the Accuracy of Two Methods of Estimating Wool Fiber Fineness. R. W. Phillips, R. G. Schott, J. I. Hardy and H. W. Wolf. *U. S. J. Agric. Res.*, 1940, V. 60, P. 343–349; abs. in *J. T. I.*, Dec. 1940, V. 31, P. A675.

In method A the diameters of cross sections of 100 wool samples, after being projected to 1,000 diameters, were estimated by comparing with a standard set of known diameters enlarged to the same magnitude. In method B the diameters of wool fibers from the same 100 samples were estimated by direct comparison with a standard set of wool samples of known diameters. Five judges estimated the diameter of each of the 100 samples on 3 different days, making a total of 1,500 observations by each method. For comparison, the average diameters of the 100 samples were determined by actual measurements of the fibers in enlarged cross sections. A statistical analysis of the results showed method B to be much less reliable than method A. There was also a tendency for method A to underestimate and method B to overestimate diameter. (C)

V. Pure Science, Economics and Misc.

The Acetylation of Cellulose: The Mechanism of Acetylation and the Properties of the Intermediate Products. T. Araki. *J. Soc. Chem. Ind.* (*Japan*), February 1940, V. 43, P. 49B–52B; abs. in *Eastman Kodak Abs. Bull.*, November 1940, P. 588.

In the homogeneous acetylation of cellulose with acetic and sulfuric acids, it was found that an intermediate sulfo-acetate of cellulose is formed at first and is split off during the later stages of acetylation. During acetylation, it was noted that the sulfuric acid content, i.e., the sulfo-acetate content, of the cellulose ester is roughly paralleled by the water solubility of the ester. (S)

Application of the "End-group" Method to the Study of the Composition of Cellulose Preparation. K. Hess, D. Grigorescu, E. Steurer, and H. Frahm. *Ber. deut. chem. Ges.*, 1940, V. 73, No. 5, P. 505–20; abs. in *Eastman Kodak Abs. Bull.*, November 1940, P. 589.

The method of Hess and Neumann (*Ibid.*, 1937, V. 70, P. 721) for the quantitative separation of tetramethyl-methyl glucoside from trimethyl-methyl glucoside was applied to several types of celluloses to study the effect of chemical pretreatment on molecular degradation. (S)

Cellulose Sheet Swelling: Effect of Temperature, Secondary Reagents, and Physical Properties on Swelling in Sodium Hydroxide Solutions. G. A. Richter and K. E. Glidden. *Ind. Eng. Chem.*, August 1940, V. 32, P. 1122–28; abs. in *Eastman Kodak Abs. Bull.*, November 1940, P. 587.

Cellulose sheet fibers show a maximum swelling and weight increase at 5° C. in sodium hydroxide, and, for equivalent molar concentrations, sodium hydroxide causes greater swelling than potassium or lithium hydroxide. The presence of wetting agents which are stable in caustic show a slight increase in swelling and adsorption from solution. The addition of ethyl alcohol in sufficient amounts will repress the swelling to values comparable with those obtained when the sheets are dipped in water. (S)

Color Vision and Chromaticity Scales. W. D. Wright. *Nature*, Aug. 3, 1940, V. 146, P. 155–58; abs. in *Eastman Kodak Abs. Bull.*, December 1940, P. 632.

The investigations into color vision, including physiological and subjective methods, are reviewed briefly. Colors can be matched by a mixture of three radiations; the C. I. E. color system has been widely adopted since its introduction in 1931, making possible the use of photoelectric spectrophotometers for the measurement of color. It has been suggested that a uniform chromaticity diagram would be more useful than the C. I. E. system, but a change in the co-ordinate system is undesirable. (S)

Dyeing Wool at Air Temperature. J. M. Gaudit. *Teintex*, 1940, V. 5, P. 183–85; abs. in *J. Soc. Dyers Col.*, Oct. 1940, V. 56, P. 454.

Dyeing of wool at air temperature, in presence of lactic, acetic, formic and sulphuric acids, has been investigated. Fine wool, even in hanks, may be dyed cold in much clearer purer shades, in presence of 1–5% lactic acid,

in a few hours, than in a boiling dyebath, and its action in preventing too rapid absorption of dye results in the production of level dyeings. Acetic acid may equally be regarded as a retardent, and, in general, a color which dyes best in presence of sulphuric acid from a boiling dyebath is best dyed cold in presence of acetic acid. This fact, which appears to be contrary to ordinary dyeing practice, is best explained by regarding the acetic acid as a solvent and wetting agent for the dye, the latter being transferred slowly and uniformly to the fiber from the solution. Formic acid (5–10% of 80% formic acid on the volume of the bath; liquor-goods ratio 10: 1) gives perfect results with regard to fastness to washing and milling in dyeing wool cold with acid, basic and mordant dyes, e.g., Alizarin Red S, or with metalliferous dyes, e.g., the Neolan colors, the latter also producing excellent results similarly on unweighed silk. The author has been unable to continue his experiments and suggests that the possibility of developing a commercial cold dyeing process for animal fibers deserves further investigation. (C)

HUE, VALUE, AND CHROMA. A. S. Allen. *U. S. Camera,* June–July 1940, V. 1, No. 10, P. 72, 77; abs. in *Eastman Kodak Abs. Bull.,* December 1940, P. 632.

The Munsell system of color notation, which classifies colors in terms of three independent dimensions, i.e., hue, value, and chroma, is briefly described. (S)

KODACHROME EXPOSURE WITH THE MICROSCOPE. G. H. Needham. *Camera Craft,* August 1940, V. 47, P. 397–408; abs. in *Eastman Kodak Abs. Bull.,* December 1940, P. 629.

Specific directions are given for making photomicrographs with cut-sheet Kodachrome Type B. (S)

THE MECHANISM OF DEFORMATION OF CELLULOSE HYDRATE: VISCOSITY DETERMINATION OF STRETCHED AND UNSTRETCHED FILAMENTS. J. de Booys, H. L. Bredée, and P. H. Hermans. *Rec. trav. chim.,* January 1940, V. 59, P. 73–6; abs. in *Eastman Kodak Abs. Bull.,* November 1940, P. 588.

The energy required to break air-dry cellulose filaments has been shown in a previous paper (*Ibid.,* 1939, V. 58, P. 63) to be sufficient to cause a rupture of the primary valence bonds of the cellulose macromolecule if a considerable proportion of the incident energy were expended in this manner. This possibility was tested by analyzing samples of cellulose filaments before and after rupture by viscosity methods. The viscosity determinations in two different solvents show no detectible change in viscosity between solutions of normal and ruptured filaments, hence no process of macromolecular degradation is indicated. (S)

OLIVE OIL SUBSTITUTES. L. L. Lloyd. *Wool Record,* 1940, V. 58, P. 598, 600, 603; abs. in *J. T. I.,* Jan. 1941, V. 32, P. A5.

Lecture to the Bradford Textile Society. After summarizing the function of oil in the processing of wool, with particular reference to the problem of residual soap after removal of the oil, the lecturer reviewed the suitability, as olive oil substitutes, of teaseed, arachis, sperm, castor, rape, Howard's "Ester" and mineral oils. (C)

ON THE HEAT TRANSMISSION OF TEXTILE FABRICS. Part II. C. D. Niven. *J. T. I.*, Oct. 1940, V. 31, P. T219–T229.

The work described in a previous communication, *J. T. I.*, 1938, V. 29, P. T161, was continued with a view to comparing the heat transmission through fabrics worn by women indoors with the heat transmission of those worn by men. The results show that women can be just as warmly clothed on the body as men without wearing unusual clothing, but that on the calf of the leg a man's clothing has a T.I.V. about twenty times that of a woman. The results are discussed from the point of view of the heating engineer. (C)

ORGANIC SULPHUR COMPOUND MILDEW ANTISEPTICS: EFFICIENCY. E. L. Everitt and M. X. Sullivan. *J. Washington Acad. Sci.*, 1940, V. 30, P. 125–131 (through *Rev. Appl. Mycol.*, 1940, V. 19, P. 421); abs. in *J. T. I.*, Sept. 1940, V. 31, P. A496.

Some 50 organic sulphur compounds have been tested for fungistatic and fungicidal power in cultures of *Fusarium* wilt organisms, *Aspergillus fumigatus*, *A. niger*, and Fleming's bacterial-inhibitory *Penicillium*. The most effective agent was mercaptobenzthiazole, which inhibited the growth of all the organisms at a dosage of 50 to 100 parts per million. (This agent is commonly used in vulcanizing rubber.) (C)

PHOTOGRAPHIC RESOLUTION IN PRACTICAL PHOTOMICROGRAPHY. R. V. Dent. *J. Biol. Phot. Assoc.*, June 1940, V. 8, P. 165–70; abs. in *Eastman Kodak Abs. Bull.*, September 1940, P. 476.

The author points out that there is considerable discussion in the photomicrographic literature on resolving power of objectives, but there is little or none on the resolving power of photographic emulsions. He warns that this is often an important factor in photomicrography and that its limits are often exceeded in photomicrography with miniature cameras. Tables showing the limit of resolving power of objectives and also of some emulsions for photomicrographic apparatus are given, with recommended developers. (S)

PROTEIN: STRUCTURE AND HYDROGEN BONDING. W. T. Astbury. *Trans. Faraday Soc.*, 1940, V. 36, P. 871–880; abs. in *J. T. I.*, Nov. 1940, V. 31, P. A636.

The various protein structures that have so far been put forward are reviewed and the possible ways in which it has been suggested that the hydrogen bond may intervene are discussed. It is pointed out that the balance of evidence is still against the cyclol hypothesis, and that there is so much in favor of some close relation and small energy difference between the corpuscular, denatured, and fibrous proteins that it is difficult to avoid the conclusion that fundamentally all proteins are fibrous. The probability that the intramolecular folds of the proteins are in essence always of the β-type is considered, and it is shown that it is at present impossible to reach a verdict that is really satisfying in regard to the hydrogen bond in protein structure. (C)

VARIOUS TEXTILE RESEARCHES SUMMARIZED. News Edition, American Chemical Society, Jan. 10, 1941; *Rayon Text. Mo.*, *March* 1941, V. 22, P. 72–3. (C)